

WHAT IS CLAIMED IS:

1. An information recording and playback method for a recording medium including a substrate forming a first groove having a depth and a second groove adjacent to said first groove and different depth from the depth of said first groove; and a recording layer formed on said substrate to record information marks, comprising the steps of:

irradiating a light to said recording medium having following relations, in optical characteristics of said marks in relation to said first and second grooves, where a relative amplitude of reflectivity of said recorded mark (a reference reflectivity is a reflectivity of non-recorded part) is  $r$  and optical phase differences of said marks of said first and second grooves are  $\phi_1$  and  $\phi_2$ , respectively, an expression of  $2N\pi = \phi_1 + \phi_2$  (where  $N$  is an integer) satisfies, and said  $r$  further satisfies

$$1 - 2 \cdot r \cdot \cos(\phi_1) + r^2 \cdot \cos(2 \cdot \phi_1) = 0 \text{ or}$$

$$1 + 2 \cdot r \cdot \cos(\phi_1) + r^2 \cdot \cos(2 \cdot \phi_1) = 0; \text{ and}$$

recording or reading out the information on said marks.

2. An information recording and playback method as defined in claim 1, wherein a plurality of said marks exist inside an optical spot of the light irradiated to said recording medium.

3. An information recording and playback method

as defined in claim 1, wherein said recording or said playback is a recording or playback of multi-value information.

4. An information recording and playback method as defined in claim 1, wherein an area changes for each of said marks.

5. An information recording and playback method as defined in claim 1, wherein an orthogonality satisfies both between adjacent marks in a radial direction and between adjacent marks in a track direction.

6. An information recording medium comprising:  
a substrate forming a first groove having a depth and a second groove adjacent to said first groove and different depth from the depth of said first groove; and

a recording layer formed on said substrate to record information marks, wherein

in optical characteristics of said marks recorded on said first and second grooves, where a relative amplitude of reflectivity of said recorded mark is  $r$  and optical phase differences of said marks recorded on said first and second grooves are  $\phi_1$  and  $\phi_2$ , respectively, an expression of  $2N\pi = \phi_1 + \phi_2$  (where  $N$  is an integer) satisfies, and said  $r$  further satisfies

$$1 - 2 \cdot r \cdot \cos(\phi_1) + r^2 \cdot \cos(2 \cdot \phi_1) = 0 \text{ or}$$

$$1 + 2 \cdot r \cdot \cos(\phi_1) + r^2 \cdot \cos(2 \cdot \phi_1) = 0.$$

7. An information playback method for reading out information by irradiating an optical spot on an information recording medium having a plurality of tracks, said method comprising the steps of:

irradiating said optical spot simultaneously on a first track and a second track adjacent to said first track, among said plurality of tracks; and

maintaining an orthogonal relation with a depth of a recorded mark recorded on said first track and a depth of a recorded mark recorded on said second track, when both the recorded marks are converted to electric signals.

8. An information playback method for reading out information as defined in claim 7, wherein when a readout signal from said first track is S1 and a readout signal from said second track is S2, frequencies of carrier waves of said S1 and said S2 are equal frequency but both phases are deviated by 90 degrees from each other, information bits "1" and "0" of said S1 are deviated by 180 degrees in phases, and information bits "1" and "0" of said S2 are deviated by 180 degrees in phases.

9. An informally playback method as defined in claim 8, wherein bit pattern positions of said first and second tracks are deviate by  $T/4$ , where T is a length on said track corresponding to a cycle of said carrier wave.